## REMARKS

In the Office Action, the Examiner reviewed claims 1-33 of the above-identified US Patent Application, with the result that claims 1-3 and 21-23 were rejected under 35 USC §102, and claims 4-20 and 24-33 were rejected under 35 USC §103. In response, Applicant has amended the claims as set forth above. More particularly:

Independent product claim 1 and its dependent claims 2-20 have been amended to recite the structure (10 in Figures 1-7) as being part of an apparatus that includes the support means (braces) 20.

Independent claim 1 has been further amended to incorporate the limitations of its dependent claim 5, to expressly recite a "causing means" (26) that causes the recited cooperation between the emitting means (14) and targets (16), and to specify that the causing means (26) selectively induces motion of the structure (10) and that such motion includes both translation and rotation motion of the structure (10) in any of six independent degrees of freedom. Support for the causing means can be found in paragraph [0031] and Figure 8. Support for the function of the causing means to selectively induce motion can be found in paragraph [0024] and original claim 10. Support for "six independent degrees of freedom" can be found in paragraphs [0028] and [0030].

Claims 5, 6, 8, and 11 have been amended to expressly recite that the "support means" comprise braces (20), and claim 8 has been amended to depend from claim 5.

Claim 7 has been amended to depend from claim 5 and require that the braces (20) are rigid. Support for this limitation can be found in Applicant's specification at paragraphs [0023] and [0032].

Claim 9 has been amended to specify that the targets (16) are formed of mineral and/or ceramic materials. Support for this limitation can be found in Applicant's specification at paragraph [0023].

Claim 10 has been amended to specify that the causing means (26) comprises means (28) for adjustably aiming the energy beams (18) at the targets (16). Support for this limitation can be found in Applicant's specification at paragraph [0031].

Claim 14 has been amended to specify that the targets (16) are mounted to the support means (20) adjacent the energy beam sources (14), but that the energy beams (18) emitted by the energy beam sources (14) impact targets (16) that are not mounted to the same support means (20) as the energy beam source (14) thereof. Support for this limitation can be found in Applicant's Figure 7.

Claim 15 has been amended for consistency with claim 1.

Independent method claim 21 has been amended in a manner similar to independent product claim 1.

Claim 22 has been amended to rephrase and hopefully clarify the step by which ablated material (22) is intercepted before collecting on source(s) (14) of the energy beams (18).

Applicant believes that the above amendments do not present new matter. Favorable reconsideration and allowance of claims 1-33 are respectfully requested in view of the above amendments and the following remarks.

**Rejection under 35 USC §102**

Independent claims 1 and 21 and their respective dependent claims 2, 3, 22, and 23 were rejected under 35 USC §102(b) as being anticipated by U.S. Patent No. 3,392,527 to Gilmour Jr. et al. (Gilmour). Applicant respectfully requests reconsideration of this rejection in view of the following comments.

As noted in §2131 of the MPEP:

> A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as is contained in the ...claim. The elements must be arranged as required by the claim, but this is not an ipsissimis verbis test, i.e. identity of terminology is not required. (Citations

omitted).

Applicant's amended independent claims 1 and 21 require an apparatus/process by which the position, alignment, and/or attitude of a structure (10) is/are controlled in a zero or low-gravity environment. The apparatus/method involves the use of energy beams (18) and targets (16) impacted by the energy beams (18) to cause ablation of the targets (14). The targets (16) and/or means (14) emitting the beams (18) are mounted to support means (20) extending from the structure 10 so as to be positioned apart from the structure (10). The apparatus/method further involves cooperation between the emitting means (14) and targets (16) such that translation and rotation motion is selectively induced in the structure (10) in any of six independent degrees of freedom of the structure (10) in reaction to motion of material (22) ablated from the targets (16) by the energy beams (18).

In contrast, Gilmour does not disclose an apparatus or process by which the alignment and/or attitude of a structure can be controlled in a zero or low-gravity environment. Instead, Gilmour's apparatus is limited to linear propulsion, and therefore cannot provide the rotation necessary to achieve alignment or attitude control. Gilmour also does not disclose any device or step for cooperation between the emitting means (11) and target (10) such that translation and rotation motion can be selectively induced in Gilmour's structure

in any of six independent degrees of freedom.

Specific to claim 22, Gilmour also does not disclose anything regarding controlling/preventing ablated material that has been deflected from the target (10) from collecting on the emitting means (11).

Specific to claim 23, Gilmour discloses nothing regarding the use of energy beams emitted in directions away from a structure and targets also spaced apart from the structure to cause the structure to undergo rotation.

In view of the above, Applicant believes that Gilmour does not anticipate independent claims 1 or 21 nor any of their dependent claims under the test for anticipation set forth at MPEP §2131, and therefore respectfully requests withdrawal of the rejection under 35 USC §102.

**Rejection under 35 USC §103**

Dependent claims 4-20 (which depend from independent product claim 1) and 24-33 (which depend from independent method claim 21) were rejected under 35 USC §103(a) as being unpatentable over Gilmour in view of U.S. Patent No. 3,270,983 to Adams et al. (Adams). Applicant respectfully requests reconsideration of this rejection in view of the following comments.

As noted above, Applicant's invention is directed to an apparatus/process by which the position, alignment, and/or attitude of a

structure (10) is/are controlled in a zero or low-gravity environment by impacting targets (16) with energy beams (18) to cause ablation of the targets (14). The apparatus/method requires cooperation between the targets (16) and the means (14) emitting the beams (18) so that translation and rotation motion can be selectively induced in the structure (10) in any of six independent degrees of freedom.

Under the §103 rejection, the Examiner explained that it would have been obvious to a person having ordinary skill in the art at the time the invention was made "to mount the jets of Gilmour Jr. et al on supports as taught by Adams et al since it will provide for all types of control including spin, attitude and longitudinal thrust." However, Adams' "supports" 28, 30, 36, and 38 are "flexible, normally straight tubes" that can only influence the rotation of Adams' satellite 10 if bent under the influence of the Coriolis effect - which only exists if the satellite 10 is already spinning. See column 1, lines 40-66. Therefore, Adams' combination of supports 28, 30, 36, and 38 (and the associated thrust nozzles 32, 34, 40, and 42) are not capable of providing any type of control of spin, attitude, or longitudinal thrust, because their sole capability is to react to and stop a pre-existing spin condition. Without a pre-existing spin condition, Adams' combination of supports 28, 30, 36, and 38 and thrust nozzles 32, 34, 40, and 42 would merely operate as linear thrusters (because they are

"normally straight"). As such, nothing in Adams is capable of "selectively induc[ing]" rotational motion, and any suggestion to modify Adams to achieve this capability would be contrary to the intended function of Adams' supports 28, 30, 36, and 38 and thrust nozzles 32, 34, 40, and 42.

In view of the above, any attempt to combine the teachings of Adams and Gilmour would result in Gilmour's apparatus being equipped with Adams' supports 28, 30, 36, and 38 and thrust nozzles 32, 34, 40, and 42, whose sole capability would be to stop Gilmour's apparatus from spinning. Therefore, the combination of Gilmour and Adams does not provide any cooperation between an emitting means (11 of Gilmour or 26 of Adams) and a target (10 of Gilmour) to induce rotational motion.

Specific to claim 4, neither Gilmour nor Adams discloses anything regarding controlling/preventing ablated material that has been deflected from a target from collecting on the means that emitted the beam that ablated the material.

Specific to claim 7, neither Gilmour nor Adams discloses mounting and spacing apart a beam-emitting means and a target with a rigid brace extending from the structure whose motion is being controlled.

Specific to claim 9, neither Gilmour nor Adams discloses the use of mineral or ceramic materials as the target.

Specific to claims 10, 15, and 28-30, neither Gilmour nor Adams discloses the capability of adjustably aiming energy beams at targets.

Specific to claim 14, neither Gilmour nor Adams discloses targets mounted to support means adjacent energy beam sources but impacted by energy beams emitted by energy beam sources on different support means.

Specific to claims 18 and 31, neither Gilmour nor Adams discloses anything regarding the use of feedback to sense the position, alignment, and/or attitude of a structure, an adaptive learning algorithm to produce modified position, alignment, or attitude data, and communicating the modified position, alignment, or attitude data to a controlling means.

For all of the above reasons, Applicant respectfully requests withdrawal of the rejection of claims 4-20 and 24-33 under 35 USC §103(a).

## Closing

In view of the above, Applicant believes that the pending claims define patentable novelty over all the references, alone or in combination, of record. It is therefore respectfully requested that this patent application be given favorable reconsideration.

Should the Examiner have any questions with respect to any matter now of record, Applicant's representative may be reached at (219) 462-4999.

Respectfully submitted,

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Attachment: Petition for Extension of Time